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ABSTRACT

Self-estimates of vocational interests have been the subject of research since 1941, but there has not been a previous review or meta-analysis. Thirty-three articles relating to self-evaluation of vocational interests were located through manual and computer searches of the psychological literature. The median values of 24 rank correlations derived from 11 idiographic studies ranged from 0.12 to 0.77. There was considerable variation in the individual's ability to estimate his/her own interests. Nomothetic studies using univariate statistics other than the product-moment correlation were considered as a discrete group. A meta-analysis procedure was used with 13 separate nomothetic studies (N= 3336) reporting 309 product-moment correlations. Correlations ranged from -0.05 to 0.89 with a mean of 0.48, and around 99 percent were positive. Based on the Schmidt-Hunter formulas, 13.1 of the observed variance was accounted for by reference to the expected variance. It was concluded that there were true differences in effect sizes across studies. Results indicated significant differences in the correlations depending on which inventory was used, but they did not support any proposed influence of vocational interest areas. (Author)

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RELATIONSHIP BETWEEN SELF-ESTIMATES OF VOCATIONAL INTERESTS AND INVENTORY SCORES

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RELATIONSHIP BETWEEN SELF-ESTIMATES OF VOCATIONAL INTERESTS AND INVENTORY SCORES

Self-estimates of vocational interests have been the subject of research since 1941 but there has not been a previous review or meta-analysis. Thirty-three articles relating to self-evaluation of vocational interests were located in manual and computer searches of the psychological literature. The median values of 24 rank correlations derived from eleven idiographic studies ranged from 0.12 to 0.77. There was considerable variation in the individual's ability to estimate their own interests. Nomothetic studies using univariate statistics other than the product-moment correlation were considered as a discrete group. A meta-analysis procedure was used with thirteen separate nomothetic studies (N=3336) reporting 309 product-moment correlations. Correlations ranged from -0.05 to 0.89 with a mean of 0.48, and around 99% were positive. Based on the Schmidt-Hunter formulae, 13.1 of the observed variance was accountable for by reference to the expected variance and it was concluded that there were true differences in effect sizes across studies. Results indicated significant differences in the correlations depending on which inventory was used, but did not support any proposed influence of vocational interests areas.

This topic, the relationship between self-estimates of vocational interests and inventory scores, has been the subject of research since 1941 but has not been the subject of a previous review or meta-analysis. The topic is one in which the research has indicated a degree of variability, with adumbrated outcomes and perceptions concerning the validity of self-evaluation.

No consensus has developed on the nature of the relationship between self-estimates and measured interests and there are opposing views as to the utility of self-estimates. There are many substantive and unresolved issues with self-estimates as an area of investigation. These issues are related to the accuracy of self-estimates, the methodology of

measurement, and factors determining the accuracy of self-estimates. As Dolliver (1969) noted attention must first be given to some terminology.

The terms "inventoried", "expressed", "measured", "self-estimates" and "self-evaluation" as methods of vocational interests assessment require some clarification. For instance, a variety of terms have been used to refer to self-estimates. These include: "stated interests", "self-evaluations", "professed interests" or "expressed interests".

A clear anlange of the principles of interest assessment was made by Super (1947). He made a significant contribution to the study of vocational interest measurement by classifying the various approaches and delineating the differences:

> "Expressed interest is the verbal profession of interest in an object, activity, task or occupation .... The subject states that he likes .... or dislikes something .... Manifest interest is synonymous with participation in an activity or occupation .... Tested interest is used here to refer to an interest as measured by objective tests, as differentiated from inventories which are based on subjective self-estimates .... Inventoried interests is assessed by means of lists of activities and occupations .... each item in the list is responded to with an expression of preference .... " (Super & Crites, 1962, pp 378-380)

Inventoried interests are exemplified by the Strong Campbell Interest Inventory (Campbell, 1977),

Kuder Preference Record (Kuder, 1960) or Vocational Preference Inventory (Holland, 1965). These utilise a heterogeneous pool of items which are used to produce scores on basic interest scales. These scores are classed as inventoried or measured interests.

Expressed scientific interests might include the occupations "medicine, biologist, pharmacist" whereas self-estimates might include statements such as "I have a very high level of scientific interest". Expressed interests have been compared to measured interests, and the evidence indicates that they have utility in vocational counselling (see reviews by Dolliver, 1969; Dolliver and Will, 1977; Whitney, 1966).

Dolliver (1969) has distinguished self-estimates of interests from expressed interests. He pointed out that self-estimates and inventoried interests were related procedures:

> "Some researchers have employed a method of investigation which they have termed the "self-estimation of interests". This self-estimation method must be distinguished from expressed-interest methods of measurement to which it bears a superficial resemblance. The distinction is that the "estimation" method is not an independent method but must be used in relation to an interest inventory. The outcome of the inventory serves as the criterion and the test taker tries to predict the relative size of his scores". (Dolliver 1969, p.96)

A self-estimate is the direct personal assessment of interest in a vocational category. This may be elicited in a number of ways, but usually involves rating one's interest in a particular occupational interest category. These self-ratings are collected for a whole set of basic interest categories. An alternative approach has been to rank the interest categories in order of preference.

Literature Search

Manual and computer searches of the psychological and educational literature were conducted, and complete searches were made of references cited in the relevant articles.

A computerised literature search was made of two major data bases: Educational Resources Information Centre (ERIC) and Psychological Abstracts. The search was guided by the use of the major descriptors '<u>self-evaluation</u>' and '<u>vocational interests</u>'. This search covered the years 1967-1986 and recovered only two relevant articles. A manual search of the Psychological Abstracts from 1937-1986 was more successful and identified thirty-two relevant articles and one doctoral thesis.

The initial criterion for selection was that the relationship of self-estimates versus measured interests had to be evaluated directly by means of a

comparison such as estimates or ratings, rather than indirectly, for instance, by comparing one's occupational choice with interests (e.g. Nelson, 1971). This criterion was established because, as noted above, self-estimated interests are distinct from "expressed" interests, which include stated occupational choices.

Thirty-five (35) articles which reported an association between self-estimates and interest inventory scores were considered in the review. These covered 44 unique samples and a total of 6037 persons.

Research Questions for the Review

The identification and specification of the research questions dictated the form of the review. The major question which warranted examination was:

- What is the relationship between self-estimates of vocational interests and scores from an interest inventory ?

Methodological features and characteristics of each study were secondary considerations, and questions of interest with respect to these features included:

- whether the type of interest inventory used in the study affected the outcome ?
- whether the measurement conditions in the study, such as anonymity affected the relationship between self-estimates and measured interests?

- whether the characteristics of the subjects (e.g. age, sex, education, personality, intelligence or vocational preparation) affected the outcomes?

Some of these questions are investigated within the framework of Holland (1973). Central to the theory are the six types of persons and a classification of occupations. Holland et al (1969) proposed a hexagonal model for defining the psychological relationships among the six types (Figure 1).

The hexagonal model arranges the main occupational categories in the following order - Realistic, Investigative, Artistic, Social Enterprising, and Conventional (proceeding around the hexagon in a clockwise direction). Adjacent categories are most closely related. In general, close relationships are represented by short distances on the hexagon.

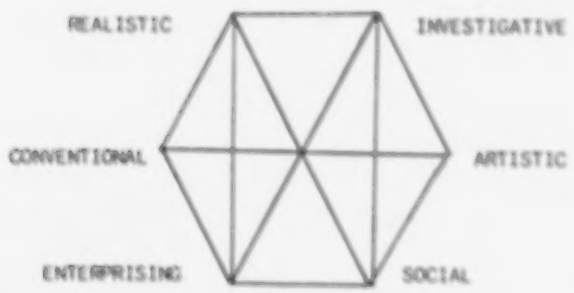

Figure 1 Holland's model for defining the hexagonal relationship among psychological types.

This theoretical model has found application in the Strong-Campbell Interest Inventory Campbell (Campbell 1977), the American College Testing Program's UNIACT Interest Inventory (Lamb & Prediger, 1981) as well as Holland's (1965) Vocational Preference Inventory and the Self-Directed Search - (SDS) (Holland, 1979). Scores from other inventories, such as the Kuder Preference Record-Vocational, can also be readily classified by Holland's six types. It has been argued that Holland's theory has stimulated a large amount of research and significantly influenced career guidance (Bernard & Naylor, 1982).

The utility of Holland's theory as a perspective from which to study self-estimates, may also be supplemented by a closer analysis of the methods used to study self-estimates. Two divergent methodological approaches have characterised the study of self-estimates of vocational interests; these have been classified as idiographic and nomothetic.

In seeking general descriptions of human behaviour, psychologists have generally adopted either nomothetic or idiographic approaches. Since the methodology of these two orientations will pervade much of this review, a brief description and clarification of these two designs will be outlined. Allport (1937) contrasted the nomothetic search for general laws of behaviour with the idiographic approach, by which every

person is considered to be a lawful, integrated behaviour system. It was Brunswik (1955), who challenged the accuracy of the generalisations from factorial and group research, and who proposed an idiographic-statistical approach. Hammond (1980) summarised Brunswik's idea that each person's behaviour is unique and that significance tests should be applied to each subject's responses to multiple situations. On the other hand, nomothetic studies seek to establish a lawfulness of responses in a given set of circumstances, and then to make generalisations from the group responses. Thus while it may be possible to state that the correlation between a group's self-estimates of an interest X,Y,Z is correlated ± 0.5 with their measured X,Y,Z interest (nomothetic), it is equally important to know that individual's Y's self-estimates of all his/her interests correlated ± 0.9 with his/her measured interests (idiographic). Therefore, both the individual and group perspectives are covered in this review. The idiographic studies will be reviewed first since they were amongst the earliest investigations.

Idiographic Studies of Self-Estimates

In eleven studies, individuals were asked to rank or rate their level of interest, and they had also been administered an interest inventory. Scores from the inventory have usually been ranked, and an intra-

individual comparison between tested and self-estimated interests has been made. Usually, the rank correlation coefficient has been calculated, and a median or average coefficient for the sample has been quoted. Thus, these are idiographic studies since they consider each individual separately over a range of interest scores (usually 9 or 10) for that person.

A listing of idiographic studies which date from 1947 to 1986 is provided in Table 1. Relevant data from separate investigations or for sub-groups were contained in five of the reports (Becker, 1977; Berdie, 1954; Dent & Elder, 1965; Kopp & Tussing, 1947; and Slaney, 1978), and this brought the total to twenty-four (24) correlation coefficients.

The investigators in these idiographic studies matched self-estimate interest categories with the interest inventory categories in every instance. Subjects were asked to rank or rate their future interest using a wide range of procedures. The Kuder Preference Record (KPR) was used as the interest inventory in five of the main studies. Other inventories used included the Lee-Thorpe Occupational Interest Inventory (Lee & Thorpe, 1943), Cleeton Vocational see (Kopp & Tussing, 1947), Interest Inventory, and Strong Vocational Interest Blank / Strong-Campbell Interest Inventory (Campbell, 1977).

The median values of the 24 rank correlations in the separate studies ranged from 0.12 (Dent & Elder, 1965) to 0.77 (Slaney, 1978) and there was considerable variation in the individual's ability to estimate their own interests.

Rank correlations ranged from -0.5 to 0.99 (Rose, 1948); -0.35 to 0.99 (Brown, 1951); -0.43 to 0.94 for valid profiles and -0.84 to 0.61 for invalid or incorrectly marked profiles (Dent & Elder, 1965); -0.04 to 0.99 (Hartman, 1965); - 0.04 to 0.92 (Breidenbaugh & Brozovich, 1971); -0.6 to 0.99 (Becker, 1977); and -0.46 to 0.96 (Athanasou, 1986). Clearly, some people were able to provide very accurate self-estimates, while others produced substantial discrepancies.

Most studies (7) used both male and female subjects, but of these only one reported results separately for each sex. Eleven correlation coefficients were reported for both male and female (x=0.55), seven for males only (x=0.58) and six for females only (x=0.56). Subjects included high school pupils, college students, counselling clients, clinical samples, rehabilitation clients and veterans. They involved mainly captive populations rather than random samples, although Slaney (1978) used paid volunteers. The sample sizes ranged from 18 (Dent & Elder, 1965) to 327 (Becker, 1977), with a median of around 80. Consistent details on the socio-economic status, ethnic

group or ability range of the subjects were not indicated.

Although this research evidence is consistent with a belief in the validities of self-estimates of vocational interests, there is considerable variation in instrumentation, procedures, and analysis which limit the ability to generalise. Nevertheless the results from these idiographic studies support the career development theory of Super (1953, 1985), but perhaps not for all individuals. This theory has posited that from adolescence onwards, many people are able to analyse and understand their interests, and are able to use this information when making decisions about careers.

Nomothetic Studies

The study of self-estimates of vocational interests has also been characterised by a wide variety of nomothetic studies. These investigations have focused upon subjects' abilities to estimate particular interest scores e.g. Arsenian (1942), Barrett (1968), Berdie (1950), and Lunneborg (1982).

Table 1 Idiographic Studies of Self-Estimates and Measured Interests

INVESTIGATORS	SUBJECTS	TASKS	RESULTS
Kopp & Tussing (1947)	(a) High school pupils Male N=115 Female N=117	S's ranked interest categories from the Kuder Preference Record (KPR) from 1 to 9. Inventory scores were ranked and compared to S's own rankings	Median rho Boys = 0.59 Girls = 0.50
	(b) High school pupils Female N=46 Male N=45	S's ranked nine interest areas from the Cleeton Vocational Interest Inventory. Ranks were correlated with the order of inventory scores.	Median rho Boys = 0.44 Girls = 0.36
	(c) High school pupils Male N=120 Female N=163	After 5 class periods of guidance, S's ranked vocational interests and these were compared to the Cleeton Vocational Interest Inventory.	Boys = 0.50 Girls = 0.53
Rose (1948)	Veterans referred for vocational guidance Male N=60	S's ranked nine interests from the (KPR)	Median rho = 0.64
Brown (1951)	Veterans-patients of a general VA Hospital Male N=65	Self-ratings correlated with ranked percentile ratings on the Lee-Thorpe Inventory	Median rho = 0.62

Table 1 Idiographic Studies of Self-Estimates and Measured Interests

INVESTIGATORS	SUBJECTS	TASKS	RESULTS
Berdie (1954)	College Students Male and Female N=118	S's (in experimental and control groups) completed the Strong Vocational Interest Blank (SVIB) and self-rating form twice at approximately 6 month intervals Experimental group (N=61) received counselling	Median rho Experimental Group First 0.46 Second 0.51 Control Group First 0.40 Second 0.41
Dent & Elder (1965)	Psychiatric patients Male N=39	Rank order of KPR scales compared to S's rank order for valid (N=18) and invalid (N=21) interest profiles	Average rho = 0.58 (valid profiles) Average rho = 0.12 Invalid Profiles (incorrectly completed)
Hartman (1965)	High school pupils Male and Female N=126	S's asked to rank KPR categories	Average rho = 0.54
Breidenbaugh & Brozovich (1971)	High school pupils Re-habilitation cases Male N=38 Female N=38	S's ranked interests from the KPR	Median rho = 0.65
Becker (1977)	High school pupils Male and Female N=327	S's indicated their percentage score in each of the KPR categories	Median rho = 0.60 (School A) Median rho = 0.62 (School B)

Table 1 Idiographic Studies of Self-Estimates and Measured Interests

INVESTIGATORS	SUBJECTS	TASKS	RESULTS
Capeto (1977)	College students Male and Female N=117	S's were asked to rank their interests and these were compared to (a) rank order of the scores on the Self-Directed Search (SDS) and (b) the rank order on the Strong Campbell Interest Inventory (SCII)	SDS Median rho = 0.55 SCII Median rho = 0.60
Slaney (1978)	(a) Undergraduates Female N=42	S's used card-sort task to rank order interest from the Vocational Preference Inventory	Median rho = 0.66
	(b) Undergraduates Female N=30	S's given card-sort theme and 2 weeks later, completed the Self-Directed Search	Median rho = 0.77
	(c) Undergraduates Female N=84	S's completed Strong Campbell Interest Inventory and 3 weeks later they ranked the six Holland vocational types	Median rho = 0.57
Athanasou (1986)	Psychiatric Patients Male and Female N=59	S's completed Vocational Interest Survey and Self-rating scale	Median rho = 0.62

The standard research strategy has been to compare the group's self-estimates on an interest dimension with a related criterion. Nomothetic comparisons have involved univariate comparisons using (i) a wide range of statistics (see Table 2) such as the contingency coefficient (e.g. Berdie, 1950); or (ii) the product-moment correlation coefficient (e.g. Bedell, 1941) - see Table 3. Another group of studies have combined aspects of both the idiographic and nomothetic approaches through the use of multivariate analyses of self-estimates and inventory responses (e.g. Athanasou, 1982, 1983; O'Hara & Tiedeman, 1959).

Table 2 Nomothetic Studies of Self-Estimated and Measured Interests

INVESTIGATORS	SUBJECTS	TASKS	RESULTS
Arsenian (1942)	College Students Male N=125	Completed SVIB, and asked to rank five out of the 27 occupations for which SVIB had scoring keys.	Contingency coefficient = 0.33
Brown (1950)	Veterans Counselling Clients Male N=50	Administered KPR first and then asked clients whether percentile score was too high, too low or just about right. Dissatisfaction with scores was assigned one point (dissent scores ranged from 0 to 9).	74.9% of interest scores were rated "just about right"
Brown (1951)	Counselling Clients/Veterans Male N=60	Administered Lee-Thorpe first and then determined assent to profile scores.	74.4% of interest scores were just about right
Gustad & Tuma (1957)	Counselling Clients Male N=58	S's completed self-knowledge inventory and SVIB. Dependent variable was (d_i) initial discrepancy between rated and tested positions and independent variable was (D) the difference between pre and post-counselling	Correlation between errors of initial self-estimates (d_i) and increase in accuracy of judgement (D) r = 0.45

Table 2 Nomothetic Studies of Self-Estimated and Measured Interests

INVESTIGATORS	SUBJECTS	TASKS	RESULTS
Barrett (1968)	9th Grade Pupils Male & Female N=100	Completed KPR as part of a test battery first and 5 point rating scale pre-test, post-test and 2 weeks later. Computed D^2 measure for high and low self-regard experimental and control groups. Test results reported to experimental group	Self-Regard: Pre-test / Post-test / Follow-up Experimental D^2 High 85.8 / 97.9 / 97.4 Low 86.8 / 92.9 / 90.8 Control High 86.7 / 85.8 / 85.5 Low 86.7 / 85.2 / 85.4
Bidwell (1969)	Schizophrenic patients Male N=51	Administered self-rating scale then KPR, General Aptitute Test Battery (GATB) and sentence completion test. Compared self-rating with KPR and calculated absolute difference (D).	Correlation of Difference with Ego-strength 0.09 Age 0.05 Education 0.38 ($p < .01$) Appropriate interests 0.29
Foreman & James (1969)	College Students Male N=120	S's rated interests on KPR on a 5-point scale. Tests and self-estimates randomly administered. Sum of the estimated and measured 5-point scale scores for entire tests were correlated for three levels of vocational relevance.	High = 0.52 Intermediate = 0.31 Low = 0.51 Total = 0.29

Table 2 Nomothetic Studies of Self-Estimated and Measured Interests

INVESTIGATORS	SUBJECTS	TASKS	RESULTS
Tierney & Herman (1973)	High school Pupils Male and Female N=149	S's completed KPR; Work Values Inventory, Otis Mental Ability Test questionnaire based on 5-point scale. KPR classified into 5 categories and discrepancy with self-estimates calculated.	Multiple Linear regression Age R^2 = 0.059 Intelligence R^2 = 0.053
Thompson & Hutchinson (1981)	Students Male and Female N=148	S's rank ordered interest themes on the SCII. Predictive accuracy score based on absolute difference between S's ranking and inventory rankings.	Mean Discrepancy score = 7.91 (t (142) = -3.88 $p < .01$)
Athanasou (1982)	High school Pupils Male and Female N=28	S's sorted interest categories into "like, dislike, undecided" and administered KPR in counter-balanced order. Compared pattern of interests using multivariate multiple regression analysis.	Λ = 0.00005 (χ^2 = 162.7, $p < .01$)
Lunneborg (1982)	Students Male and Female N=522	S's ranked worker traits from DOT. Five bipolar interests were compared to Vocational Interest Inventory	18 out of 20 hypothesised correspondences were reported (10 males, 10 females)
Brown, Fulkerson, Vedder & Ware (1983)	School Pupils Male N=123 Female N=146	Completed 9 point 25 item self-estimate questionnaire then DAT, Career Decision Making, Tennessee Self-concept Scale, Work Values Inventory. Used global measure for self-awareness of 25 values.	Mean Transformed Correlations Males Zr = 0.35 (N = 123) Females Zr = 0.27 (N = 146) Grade 8 Zr = 0.35 (N = 92) Grade 10 Zr = 0.32 (N = 89) Grade 12 Zr = 0.34 (N = 88)

Nomothetic studies using univariate statistics other than the product-moment correlation will be considered as a discrete group. These twelve empirical studies are listed in Table 2, and comprised a wide variety of designs and treatments. Six studies used only male subjects and six used both males and females. There were no studies devoted to females only, although Brown et al (1983) reported results separately for males and females. Brown et al (1983) indicated that both males and females were able to significantly estimate their scores on aptitudes, interest, self-concept and values.

Sample sizes ranged from 28 to 522, the smallest (28-60) and largest samples (200+) tended to produce results which favoured the accuracy of self-estimates. Overall, 5 studies indicated a positive and significant relationship between self-estimates and measured interests, three studies could be interpreted as having negative results (Arsenian, 1942; Foreman & James, 1969; Thompson & Hutchinson, 1981) and a further three were concerned with moderating factors such as self-regard (Barrett, 1968), ego-strength (Bidwell, 1969) or demographic factors (Brown et al, 1983) or age and intelligence (Tierney & Herman, 1973). Although the Kuder Preference Record (KPR) was used in six studies, and the Strong Vocational Interest Blank (SVIB) or the Strong Campbell Interest Inventory (SCII) was used in two studies, it did not appear from the categorisation

of outcomes, that the type of interest inventory used in a study affected the result.

Early studies such as those by Arsenian (1942), who compared the ranking of occupational preferences to scores on the SVIB, noted wide individual variation. Nevertheless the confidence expressed by individuals in their self-ratings was significant (e.g Brown 1950, p.227), and among students at the tertiary level, there was found to be a considerable understanding of the rank order of the SCII interest themes (Thompson & Hutchinson, 1981). Athanasou (1982) found that the group's average percentile score on the Kuder Preference Record varied across three levels of self-estimated interests. In categories marked "like" the average percentile score for the group was 66.3% (n=100), for "undecided" interests the average group percentile score was 47.6% (n=60) and for "disliked" interests the average percentile score was 38.1% (n=120); that is, there was a direct relationship between categorisation of self-estimates and level of interest.

Some investigators have argued that self-estimates and measured interests are part of a common domain. Lunneborg (1982) adopted the worker trait scheme of the Dictionary of Occupational Titles as an experimental questionnaire, which he administered to 522 high school students. He used five bi-polar interest dimensions

(e.g. dealing with things or objects versus concern with people, and communication of ideas) and compared these with scores from the Vocational Interest Inventory. Correspondence between self-assessment and measured interests was hypothesised in 20 instances, and 18 of the 20 were realised. He noted; "There is strong reason to believe then, the two are tapping the same things" (p.274).

Group comparisons have provided some support for the validity of self-estimates; but this was not a universal finding. In part, it reflects the fact that the above studies had different aims and were often directed to exploring discrepancies between self-estimates and measured interests, as well as having significant differences in methodology (e.g univariate versus multivariate analyses). A second and separate group of nomothetic studies with a consistent statistical methodology, was also examined.

Nomothetic Studies Based on Product-Moment Correlations

Twelve published articles and one doctoral thesis (Capeto, 1977) comprising 22 independent samples were found, which met the criteria of (i) reporting self-estimates, and (ii) reporting product-moment comparisons. These reports, which are listed in Table 3, indicated a diversity of study outcomes.

Table 3 Nomothetic Studies of Self-Estimated and Measured Interests-Studies Based on Product-Moment Correlations

INVESTIGATORS	SUBJECTS	TASKS	RESULTS
Bedell (1941)	College Students Female N = 141	Correlation computed between millimetre measures of ratings on a 5-point scale for 17 occupational scales from the SVIB.	Average of all scales r = 0.29
Crosby & Winsor (1941)	College Students Male and Female N=222	S's estimated percentiles and compared these to Kuder Preference Record (KPR) vocational interest scales.	Average r = 0.52 (N=111 General Psych. students) Average r = 0.56 (N=111 Educational Psych. students) Overall r = 0.54
Moffie (1942)	Students Male N=80	S's indicated interest on a 5-point millimetre scale, and this was correlated with SVIB scales.	Average r = 0.21
Di Michael (1949)	Vocational Counsellors Male and Female N=146	Two groups: (A) N=100 and (B) N=46 Group A completed KPR, followed by self-estimates after 5 months, and KPR again. Group B completed self-estimates and KPR. Five point rating scale used, with a range from 0 - 20.	(A) Average r=0.36 (1st KPR vs Self-rating) Average r=0.61 (2nd KPR vs Self-rating) (B) Average r=0.51
Berdie (1950)	N=500 Male Counselling clients Pre-college (N=195) Students (N=286) Non-college (N= 19)	Administered KPR, SVIB and 5-point rating scale on 9 occupational groups in counterbalanced order	Average Contingency coefficient SVIB = 0.43 KPR = 0.52

Table 3 Nomothetic Studies of Self-Estimated and Measured Interests-studies Based on Product-Moment Correlations

INVESTIGATORS	SUBJECTS	TASKS	RESULTS
Zaccaria, Page & Clayton (1956)	Airmen Male N=550	S's rated 33 job areas on a 5-point scale, and responses were related to the 8 scales of the Airman Activity Inventory.	Average r=0.46
Cloud & Zaccaria (1957)	Airmen Male N=82	Compared holistic with atomistic approaches. In the holistic approach S's rated themselves on a cluster of 5 vocational statements (5-point scale). In the atomistic approach there were 5 subtests with separate items.	Average r=0.86
O'Hara & Tiedeman (1959)	High School Pupils Male Grade 9=321 Grade 10=276 Grade 11=264 Grade 12=160	KPR compared to self-ratings from from Grades 9 to 12.	Average r Grade 9=0.46 Grade 10=0.50 Grade 11=0.51 Grade 12=0.56
Omvig & Darley (1972)	High School Pupils Male N=52 Female N=47	Self-estimates compared to Ohio Vocational Interest Survey (OVIS) raw scores. Self-ratings based on a 5-point rating scale.	Average r Females = 0.35 Males = 0.45

Table 3 Nomothetic Studies of Self-Estimated and Measured Interests-Studies Based on Product-Moment Correlations

INVESTIGATORS	SUBJECTS	TASKS	RESULTS
Osvig & Darley (1972)	High school Pupils Male (N=52) Female (N=47)	Self-estimates compared to Ohio Vocational Interest Survey (OVIS) raw scores. Self-ratings based on a 5-point scale.	Average r Females = 0.35 Males = 0.45
Osvig & Thomas (1974)	High school Pupils Male and Female N=101	Self-estimates compared to OVIS using 5-point rating scale.	Females = 0.67 Males = 0.42
Capeto (1977)	College Students Male and Female N=117	Scores on the 23 SCII basic interest scales were correlated with ratings on the 23 self-estimate basic interests scales.	Average r = 0.60
Athenasou & Evans (1983)	Guidance clients Male and Female N=218	Self-estimates compared to KPR using a 7-point rating scale.	Average r = 0.50
Athenasou (1986)	Psychiatric Patients Male and Female N=59	S's completed Vocational Interest Survey and Self-Rating Scale	Average r = 0.62

A "meta-analysis" procedure in which "studies replace individuals as the unit of analysis" (Sackett, Harris & Orr, 1986), was used as a component of this review, in order to more systematically analyse the previous nomothetic studies. Hattie & Hansford (1984) have pointed out that: "Meta-analysis is a quantitative way to reduce the findings of many disparate studies to a common metric, and then to relate this common value to independent variables of a study" (p. 239).

An understanding of the approach to cumulating results across studies of self-estimates is helpful if it is incorporated into the broader context of recent methodological developments in psychology which seek to establish general principles, Schmidt et al (1980) noted that:

> "....in psychology and the other social sciences, it is often, perhaps typically, the case that after numerous studies have been conducted on a given problem or hypothesis, findings vary substantially across studies. Traditional review procedures are inadequate to integrate conflicting findings across large numbers of studies .... sutdies collectively contain much more information than we have been able to extract from them to date. He [(Glass, 1976)] points out that because we have not exploited these gold mines of information, "we know much less than we have proven" (Glass 1976, p.8). What is needed are methods that will integrate results from existing studies to reveal patterns of relatively invariant underlying relations and casualities, the establishment of which will constitute general principles and cumulative knowledge" (1980, p.653).

Meta-analyses have been used to examine:-

- differential validity of employment tests by race (Hunter, Schmidt & Hunter, 1979);
- class size and school achievement (Glass & Smith, 1979);
- sex differences in conformity research (Cooper, 1979);
- experimenter effects in behavioural research (Rosenthal, 1976);
- sex bias in counselling and psychotherapy (Smith, 1980); and
- self-measures and indices of performance and achievement (Hansford & Hattie, 1982).

The purpose in conducting a meta-analysis of the literature on self-estimates of vocational interest was to determine whether the variance in reported convergent validity coefficients was entirely the result of sampling error.

In the Schmidt-Hunter meta-analysis procedure the impact of statistical artifacts such as sample size and measurement error due to the use of unreliable measures are examined. The model estimates:-

(i) the amount of variability in effect sizes that can be expected due to sampling error and other artifacts; and

(ii) compares this with observed variability in effect sizes across studies.

If the variance expected due to artifact (e.g sampling error) equals or nearly equals observed variance in effect sizes, Schmidt and Hunter would conclude that there are no true differences in effect sizes across studies, and hence no need to search for potential moderator variables to explain differences in study findings.

Hunter, Schmidt & Jackson (1982) proposed techniques for cumulating correlations across studies. For a set of studies, the sample size weighted mean correlation is:

$$\bar{r} = \frac{(N_i r_i)}{N}$$

where r = correlation from the i th inventory scale and N is the size of the sample

The observed variance of the correlations is computed by:

$$\delta_r^2 = \frac{(N_i (r_i - \bar{r})^2)}{N_i}$$

and for the set of studies sampled, the expected variance of the correlations is:

$$\delta_e^2 = \frac{k((1 - \bar{r})^2)^2}{N_i}$$

where k = number of interest scales studied

The expected variance is compared to the observed variance (σ_e^2 / σ_r^2). Hunter et al (1982) argued that if 75 per cent of the observed variance is accountable for by reference to the expected variance, then the remaining variance is probably due to other artifacts. A formula for correction of range restriction is also suggested (1982, p.61) since studies whose variance is less than the population will attenuate the correlation and thus understate the true association. A final factor to be considered is the attenuation of correlation due to unreliability in the instruments used to measure either variable in a bi-variate association. Thus, there are three potential sources of artifactual variance in the studies reviewed: (i) sampling error; (ii) range variations; and (iii) variations in scale reliability.

The thirteen studies reporting product-moment correlations were important because they presented anywhere from 5 to 24 correlation coefficients to depict the relationship between self-estimates and criterion interest measures. On the other hand each idiographic or rank-correlation study usually provided only sparse data, such as, average or median rank correlation.

A total of 3336 subjects participated in the 12 studies and many of these (36.6%) involved school students. A number of other groups were also

represented, for example, college students (16.7%), vocational counselling clients (21.5%) clinical groups (1.7%) and employees (23.3%). Although sample sizes within the reports ranged from 59 to 1021, the maximum sample size for any one correlation was only 550 (Zaccaria, Page & Clayton 1956). The criterion interest measures used were the Kuder Preference Record (Kuder, 1960), the Ohio Vocational Interest Survey (D'Costa, Winefordner, Odgers & Koons, 1969), Strong Campbell Interest Inventory (Campbell, 1977), Self-Directed Search (Holland, 1970) and specially constructed measures. On the other hand, the self-estimate measures showed greater variability with different rating scales, oral and written formats, card-sort tasks, occupational and work-activity descriptions. Therefore, it seems fair to assume that the studies collected for review sampled a wide variety of tasks across subject populations, and that the results may be generalizable to the study of self-estimates of interests as a whole.

All studies assumed a straightforward methodology, mainly correlational and descriptive in nature without experimental intervention. The general case was that the self-estimate measure was administered first and then followed by an interest inventory across a large and diverse group of subjects.

To cite two examples of studies in this field, it is instructive to look first at the work of Omvig and Darley (1972). The design for this study included obtaining self-estimates of vocational interests on a 5-point Likert-type scale and comparing these to the tested interest scores on the Ohio Vocational Interest Survey (OVIS-D'Costa et al., 1969) for a sample of 99 black disadvantaged students. The vocational areas on which self-estimates were based corresponded to the 24 work interest areas on the OVIS. Each of the 24 interest descriptions was read aloud to the students and they indicated their rating from "like very much" to "dislike very much". Product-moment correlations between self-estimates and OVIS scores for each of the 24 categories, separately for females (n=52) and males (n=47). O'Hara and Tiedeman (1959) examined high school students' estimates of their aptitudes, interests, social class and values across grades 9 to 12. The Kuder Preference Record (Kuder, 1960) was used to measure interests, and the self-estimate questionnaire contained Kuder's description of the ten vocational interest categories. Canonical correlations were computed for each grade in this cross-sectional study, and product-moment correlations were also reported. Although some details of the methodology were not available, the size of the samples and the statistical treatment of the data for each grade (Grade 9, N=321; Grade 10, N=276; Grade 12, N=160) made this one of the better studies reported in the literature.

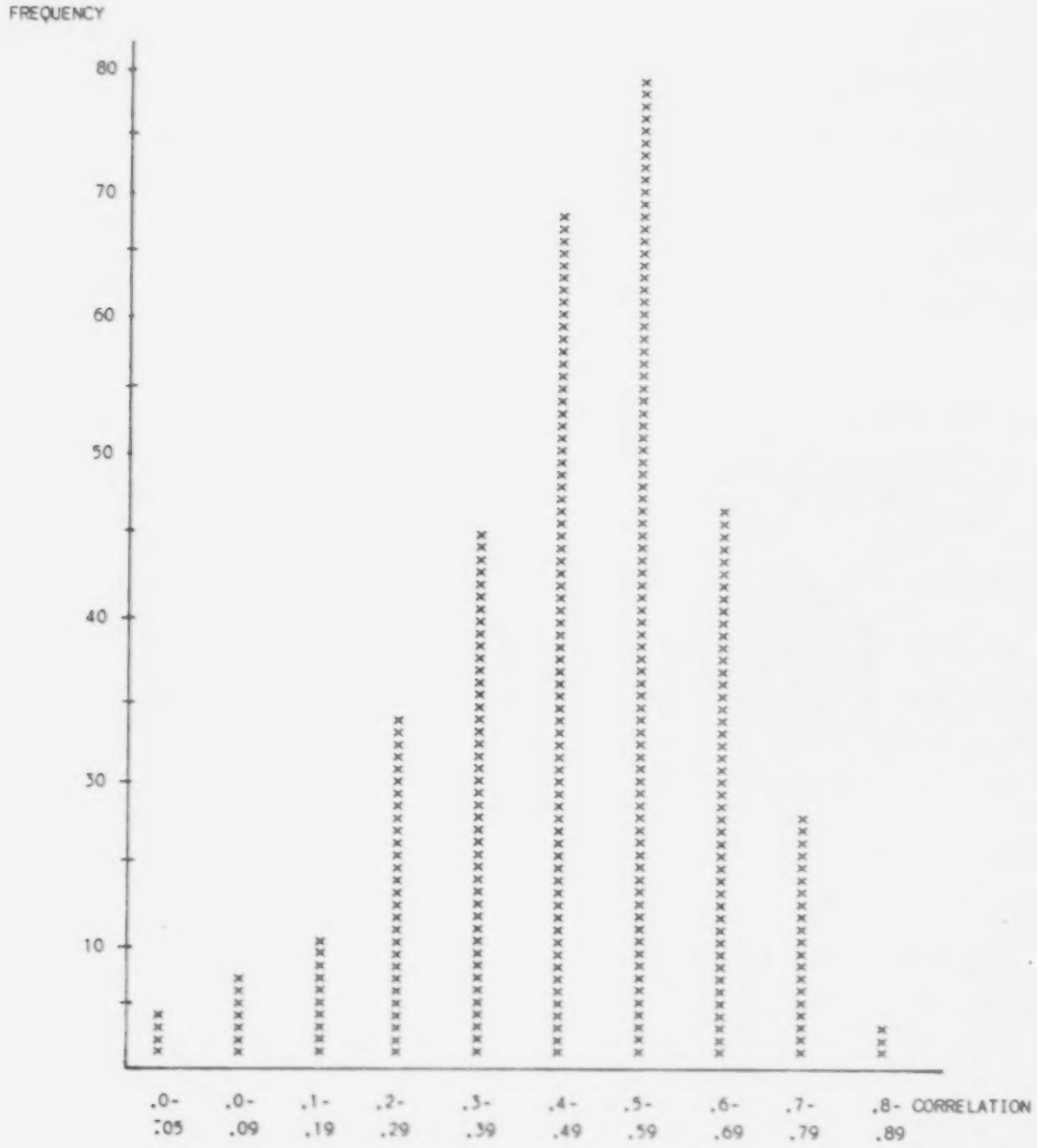

Figure 2 Frequency distribution of product-moment correlation from the meta-analysis (N=309)

Meta-analysis of the nomothetic correlations

A total of 309 correlations were reported in the nomothetic studies. Since each study reported more than one correlation, they are not strictly independent but rather repeated measures. Correlations ranged from -0.05 to 0.89 with a mean of 0.48 and a standard deviation of 0.15. The significance of this mean cannot be considered in isolation from the mean effect size, that is only some 23% of the variance was accounted for by self-estimates. In (Figure 2), the distribution of the validity coefficients is presented. Some 98.7% were positive and greater than zero, and 74.8% were greater than 0.4.

Diversity in study outcomes may have been due to subtle differences in setting, subjects, and researchers. Other sources of artifactual between-study variance identified by Schmidt et al (1976) may also be relevant to this meta-analysis:

- sampling error (i.e. variance due to $N<\infty$);
- differences between studies in predictor reliability and/or criterion reliability;
- differences between studies in range restriction;
- computational, typographical and transcription errors;
- differences in factor structures between tests of a given type (e.g. interest inventories); and
- criterion contamination and deficiency.

Based on the Schmidt-Hunter formulae, the observed variance was 0.024608, and the variance expected due to sampling error was 0.003236. This means that 13.1% of the observed variance can be explained by reference to the expected sampling error variance, which leads to the conclusion that there were true differences in effect sizes across studies. Therefore, there is a real need to search for potential moderator variables to explain the differences in study findings.

Thus available evidence indicates that the search for other factors which may contribute to the validity of self-estimates may be worthwhile. This hypothesis was tested by considering the impact of a number of possible factors on people's judgements of their measured interests. The first factor to be considered was the actual conditions of testing, and then specific attention was directed to personal factors.

Before this was done, correlational data from the studies were broken down by interest type in order to identify interest areas that have produced unusually high or low correlations between self-estimates and criterion measures. Holland's (1965, 1973) categorisation of vocational interests was used as a guiding framework to enable results from disparate studies to be considered in a coherent and meaningful way. Coding of the interest categories was straightforward, using tables prepared by Holland

(Holland, 1973), and the Occupations Finder in the Self-Directed Search (Holland, 1979).

The results are summarised in Table 4. The average correlations were consistent across all six of the Holland (1973) vocational types; although, there was some evidence that sampling error was a larger influence in the Artistic category (21.8%) compared to the Realistic category of interests (7.0%).

Table 4 Meta-analysis of Validity Coefficients across Holland Vocational Interest Types (N=290)

HOLLAND VOCATIONAL INTEREST CATEGORY	NUMBER OF CORRELATIONS ANALYSED	TOTAL SAMPLE SIZE	AVERAGE CORRELATION	% OF OBSERVED VARIANCE ATTRIBUTABLE TO EXPECTED
Realistic	70	17597	0.51	7.0%
Investigative	37	6413	0.43	20.4%
Artistic	63	10989	0.49	21.8%
Social	55	7417	0.42	22.3%
Enterprising	38	4687	0.46	20.3%
Conventional	46	8911	0.49	12.4%
TOTAL	309	56014	0.48	13.1%

Testing Conditions

Mischel (1968) reported numerous examples of the effects of situational factors on assessment behaviours. He showed that behaviour is often highly

situation specific and responses are influenced by the mode of measurement. None of the studies on self-estimates of interests which were reviewed compared validity results under different testing conditions. Given that validity coefficients varied from -0.05 to 0.89, it seems reasonable to examine this variability in correlations. That is, a large part of this variability in apperceptions may be attributable to particular testing conditions, and the ecology of the measurement environment.

Mabe and West (1982) have outlined some of the possible conditions to be controlled in self-evaluation studies of ability, and some of these measurement conditions are directly applicable to the measurement of interests. The requirements specified by Mabe and West were transcribed to apply to interests:

(i) Match - were the descriptions in the self-estimate and criterion interest measure comparable, that is, did they include similar types;

(ii) Rating type - whether the self-evaluation elicits future or past interest;

(iii) Relative evaluation - whether social comparison terminology is included in the self-estimate, e.g. "better than average" or was it based on ranking of interests or absolute estimates of test scores;

(iv) Group-comparison - whether there is reference to a comparison group, e.g. same sex in making estimates;

(v) Range and distribution - whether the range and distribution of scores on the vocational interest category was given prior to making self-estimates;

(vi) Anonymity - whether there was confidentiality or non-competitive conditions for assessment;

(vii) Expectations of validation - whether it was stated directly or it was implied that self-estimates would be compared to measured interests; and

(viii) Self-evaluation experience - whether the study design provided for experience in self-evaluation prior to estimating interests.

Selection of the measurement conditions to be considered in any analysis was hampered by a lack of variability across studies. Twenty (20) samples from eleven studies fulfilled five (5) of the above measurement conditions, and one (1) sample satisfied six (6) of the measurement conditions. All studies included an expectation of validation by the subjects participating, a rating of future interests, comparison with group norms, and a complete match between the self-estimates and the measured interest categories.

Only one study (Di Michael, 1949) gave information on the range and distribution of scores on the vocational interest category prior to making self-

estimates. The two samples in the study by Crosby and Winsor (1941) varied testing conditions. Subjects actually attempted to estimate percentile scores, and were also provided with practice at making self-evaluations (e.g height). The average correlation in Crosby and Winsor's study was 0.53 for interests (and 0.74 for height). There was more variation due to sampling error in both the above studies compared to the overall meta-analysis. Since both these studies utilised the Kuder Preference Record (KPR), the results were compared with other studies of the KPR (See Table 5).

It was inferred that these slight variations in testing procedure did affect the typical validity coefficients.

Table 5 Measurement Conditions and Validity Coefficients

Additional measurement conditions	Number of correlations	Total sample	Average correlation	% of observed variance
Range and distribution	9	900	0.61	44.5%
Prior self-evaluation experience and absolute estimate of scores	14	1454	0.53	72.3%
All other studies using KPR	84	19092	0.50	21.7%

However, in reviewing the various studies, two factors or conditions were noted which may have had some impact on results. The first of these related to

whether the Kuder Preference Record was used as the criterion interest inventory. Around half of the product-moment correlations between self-estimates and measured interests were obtained with this interest questionnaire. The second condition examined was whether there were interactions between the type of questionnaire and categories of vocational interests.

The independent categories in this analysis of the convergent validity coefficients were the two measurement conditions: (i) whether the Kuder was the interest quesitonnaire utilised and (ii) the six interest categories described by Holland (1973) as Realistic, Investigative, Artistic, Social Enterprising, and Clerical.

The dependent variables were the correlation coefficients converted to Fisher z_r correlations in order to eliminate variations in sample size. These were analysed in a 2 way ANOVA with unequal N and fixed effects.

The interaction effect between interest categories and the type of questionnaire used was non-significant ($F(5,60) = 1.95$ $p=0.09$), and therefore, the row (ie KPR) and column variables (ie interest categories) may be considered separately.

Results indicated that there were significant differences ($F(1,12) = 4.8$ $p < 0.05$) in the correlations between self-estimates and measured interests depending on whether the Kuder Preference Record was or was not used. The mean z_r value of correlations obtained with the KPR was 0.60 compared to 0.48 for correlations obtained using other interest inventories. However, the result that interests measured by the KPR were easier to predict is difficult to interpret. It may be the case that the categories used by the Kuder are familiar, relevant and easily understandable to subjects than some of the other inventories.

There were no significant differences across the categories of vocational interests ($F(5,60) = 1.47$ $p = 0.21$) and results did not support any proposed influence of vocational interests areas (see Table 6). That is, it seemed equally easy or difficult to estimate one's interests, whether they were practical, scientific, artistic, social, business or clerical in nature.

Discussion

Many psychologists (e.g Darley & Hagenah, 1955) accepted the explanation that it was generally a bankrupt procedure to attempt to estimate the scores on a vocational interest inventory (see Mabe & West, 1982). This was consistent with the belief that the human observer is too inefficient an information processor to make valid estimates. However, results from a wide range of studies indicate that subjects can access their interests and that their responses represent important data.

Available evidence from idiographic studies indicated that some people were able to rank their interests in much the same order as their scores from an inventory. The very high rank correlation coefficients of some subjects (i.e 0.99) pointed to remarkable self-estimate ability, considering that with ten (10) interest categories on commonly used interest inventories such as the Kuder Preference Record, there were some 3,628,800 possible rank combinations.

The extension of the validity generalisation model developed by Schmidt and Hunter (1977) to the analysis of 309 product-moment correlations from group studies of self-estimates of vocational interests, provided compelling support for the conclusion that the observed variation in convergent validities from study to study

was not artifactual in nature. However, the average correlation of 0.48 compares favourably with self-evaluations of ability. Mabe and West (1982) reported that the sample weighted mean correlation from 55 studies was 0.31 for abilities. In this meta-analysis the result was affected by two factors: (i) a low N per correlation; and (ii) lack of independence between correlations in each study.

Furthermore, correction for factors such as criterion unreliability, and range restriction would likely increase the reported validity coefficients. Indeed, reliability data are essential to interpret validity coefficients since attenuation suppresses validity coefficients (Lee, Miller & Graham, 1982). Only four studies reported estimates of reliability for either the self-estimate or the measured interest (Athanasou, 1986; Cloud & Zaccaria, 1957; Di Michael, 1949; and Zaccaria, Page & Clayton, 1956). Results of those studies which examined test-retest reliability of self-ratings, based on single items, showed coefficients ranging from 0.43 to 0.72 (Athanasou, 1986; Cloud & Zaccaria 1957; Zaccaria, et al. 1956). Zaccaria, et al. (1956) computed test-retest reliability of self-ratings over a one month period for 382 basic airmen. They reported coefficients which range from 0.43 to 0.70 with a median of 0.55. However, these were not as stable as measured

interests. For the Airman Activity Inventory stability coefficients on the eight scales ranged from 0.61 to 0.80 with a median 0.76 (N=382). Test-retest reliability coefficients for a sample of 198 females over a six month period for ten self-rating interest scales varied from a low of 0.59 for Persuasive to 0.79 for Scientific interests (Athanasou and Evans 1983). Although the correlations between self-estimates and interest inventory scores should be corrected for attenuation, this was not done because very few investigators reported reliabilities.

An additional constraint was that the 5, 6 or 7 point rating scales commonly used to assess self-estimates involved a restriction of range compared to measured interests, which are usually scored as percentiles from 0% to 100%. If the scaling of the self-estimates reduced the variance by say, a fourth, then a typical correlation of around 0.5 would increase to around 0.8; this would be about the theoretical maximum limit of the correlation between self-estimates and measured interests after correction for attenuation. Therefore, it would appear that the typical correlation of 0.5 represents an underestimate, given the limitations and restrictions of psychological measurement.

Some of the observed differences across studies may result from variations in research strategies and methodology which impinged upon the cognitive processes that underly self-estimates. In the first instance, there has been no standardised self-estimate procedure. Even though 5, 6 or 7 point rating scales were commonly used, there have been a number of procedural variations, such as card-sorting of interests, estimation percentile scores, as well as verbally administered versus written task instructions. Moreover, there was generally no attempt to counterbalance the order of administration. In around half the studies, the interest inventory was administered prior to the self-estimate procedure. Studies in which the interest inventory was administered first reported somewhat higher mean correlations (0.63) than those in which the questionnaire was administered last (0.54). In other instances, it is not known whether self-estimates were made before or after the measured interests. A further limitation may arise from whether subjects perceived the procedure as anonymous, and whether they expected their self-estimates to be validated (cf Mabe & West, 1982). The majority of studies were also limited to small samples or one geographical location or they concentrated on individual differences which may influence the validity of self-estimates.

A number of proposals which relate to the methodology of the typical study might be considered in order to advance our knowledge in this field. The standard research strategy has been to administer an interest inventory to a sample of volunteer subjects, then to ask them to estimate their interests, and to correlate scores. This procedure should be retained, and can be enhanced by (i) counterbalancing the presentation of the inventory, (ii) utilising larger samples to reduce error, (iii) standard written instructions for self-ratings, and (iv) providing feedback to subjects. In this way it will be possible to assess the validity of self-estimates in a non-competitive context similar to the career guidance situation, and to build upon the findings of the previous research.

Previous studies have also been restricted to single rank order correlation coefficients as the dependent variable. The use of distance measures as indices of profile similarity have a long history and ought to be considered as viable approaches to the validity of self-estimates. Skinner (1978) outlined procedures whereby two profiles can be contrasted using estimates of profile similarity (Skinner, 1978), and how the distance between two profiles can be separated into its components.

In the numerous studies investigating the validity of self-reports of interests there is no reference to the discriminant and convergent validity of self-estimates, or any justification as to why self-estimates of say Scientific interests are expected to correlate significantly with a particular criterion. This can be rectified easily by analysis of a multitrait - multimethod matrix (MTMM), which would then provide some justification for the convergent and discriminant validity of self-estimates. None of the studies employed the complete multitrait-multimethod matrix (Campbell & Fiske, 1959).

Finally, vocational interests and Self-estimate ability may also be examined within the scope of a vocational choice theory (e.g. Holland, 1973). For instance the ability to make accurate self-estimates may be linked to particular vocational types, or the consistency of interests or the extent to which there are clearly differentiated interest patterns.

Conclusions

The overall conclusion was that the findings of this study support the views of Mischel (1968). Firstly, he proposed that in the process of assessment, our questionnaires and inventories should be evaluated against self-estimates. In a later article he contended that "what the person tells us directly turns

out to be as valuable an index as any other more indirect sign" (Mischel, 1977, p.243). Burisch (1984) examined major approaches to personality scale construction in a comparative review of more than a dozen studies. He recommended the simple deductive approach on the grounds of economy and effectiveness of communication, but also argued that the widespread preference for questionnaires was not justified. Burisch (1984, p.225) concluded that self-estimates (i.e. self-rating scales) could be considered as substitutes, or alternatives to questionnaires:

> "If you ask subjects to rate themselves directly on simple trait-rating scales, these self-ratings turn out, on average, to be more valid than corresponding questionnaire scales ..... if self-ratings are (a) directly communicable, (b) the ultimate in economy, and (c) also more valid than their questionnaire counterparts, then we will have to face the somewhat embarrassing question of just why we continue to construct personality inventories at all". (p.225).

According to Katz (1972) who reviewed the Strong Vocational Interest Blank for the Mental Measurement Yearbook:

> "Research must deal with the most basic question of all, which should be addressed to every interest inventory: Is is worth the trouble? More specifically, is more valid and useful information obtained from having a student respond to some 400 items, with all the attending costs and complexities of scoring, reporting, etc., than from having him relate his interests, simply and directly, once, for each scale (occupational or basic) represented by an array of items? This is the question of incremental validity: Does the inventory add significantly to what

> the student already knows? The way to find out is to pit the inventory against the direct rating of interests." (p.1464).

The issue of rating scales vs questionnaire scales was a central concern of this report. Accordingly, the issues and claims raised by Burisch (1984) Katz (1972), Mischel (1968, 1977) and others, pose a number of important theoretical and practical questions for vocational guidance and further research. The available evidence shows that there is a statistically significant positive relationship between career interest scores from an inventory and self-estimates of the same interests.

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